

A third and last experiment was made with a wire laid obliquely across the Welsh Harp lake, and allowed to sink to, and rest upon, the lake bottom. The length of the line was roughly estimated at about one-third of a mile, and from end to end (excepting a few yards at each end where the wire was led from the water's edge to the telephone box) the wire was completely immersed, and without any other support than the bottom of the lake offered it. Yet, notwithstanding this immersion of the whole wire, conversation was carried on through it by means of the pulsion instruments without the least difficulty. In fact, the voice came through the immersed wire, and the longest wire (of over three miles) previously mentioned, with greater purity and mellowness than through shorter lengths.

I must leave to others to explain, and if necessary to discover, the scientific grounds of the success of this extraordinary little instrument. Looking, however, at its practical capabilities as exemplified above, it is not surprising that Post Office, police, railway, and other commercial people, are already overwhelming with applications those who are arranging to supply the new telephone, which from its extreme simplicity is manifestly a cheap one.

NOTES.

No fewer than 1810 patients bitten by dogs were treated at the Pasteur Institute in the year ending October 31. There were thirteen deaths.

THE *Daily Graphic*, the first number of which will appear on January 4, will be interesting from a scientific as well as from a popular point of view. Twenty years ago, when the *Graphic* was started, so bold an enterprise would have been impossible. At that time the pictures in illustrated journals were produced only by the old method of wood-engraving, which could not, of course, supply all the needs of a daily illustrated paper. By means of various scientific processes, drawings can now be so rapidly and effectively reproduced, that the issue even of a daily illustrated journal may be safely undertaken. The new paper is likely to afford a very striking instance of the influence of these processes on art and journalism.

THE Government of New South Wales has adopted an entirely new scheme of technical education. The present Board of Technical Education is to be abolished, and technical schools will be placed under the direct control of the Education Department. A sum of £50,000 is to be expended in the erection and equipment of a new Technical College and Museum in Sydney, while branch technical schools will be established throughout the country districts. It is estimated that £50,000 will be required annually to carry out the new arrangements.

MR. E. W. COLLIN has been deputed by the Government of Bengal to make inquiries as to the present condition of technical education in Bengal, and to find out what steps should be taken by the Government towards its advancement in that Presidency. The Civil Engineering College at Seebpore, an institution for the training of overseers and civil engineers, is supported by the Bengal Government, but it does not appear that there are any means at present in Bengal for the technical training of artisans. Mr. Collin has addressed a circular to various public bodies asking for information, and he will submit a report on the question about the end of the year.

MR. G. BERTIN is to deliver, at the British Museum, a series of four lectures on the religion of Babylonia. The first lecture will be given on November 26, and the others on the three following Tuesdays, at 2.30 p.m.

MR. G. B. SCOTT, of the Indian Survey Department, who has lately been employed on a survey of the Wards Estates in Bengal, has been placed in charge of the new Cadastral Survey of Upper Burmah.

THE next *conversazione* of the Royal Microscopical Society will be held on Wednesday, the 27th instant, at 8 o'clock.

MR. THOMAS CHILD, who has just returned from Peking, has sent us very beautiful photographs of the two interesting old astronomical instruments at the Peking Observatory. These instruments are the most ancient of the kind in the world, having been made by order of the Emperor Kublai Khan in the year 1279. They are exquisite pieces of bronze work, and are in splendid condition, although they have been exposed to the weather for more than 600 years. They were formerly up on the terrace, but were removed down to their present position to make way for the eight instruments that were made by the Jesuit Father Verbiest in 1670, during the reign of the Emperor K'ang Hsi, of the present dynasty.

THE metric system of weights and measures having been adopted in the Photographic Office of the Indian Survey, a series of tables for the conversion of these measures to British, and *vice versa*, has been prepared by Colonels Thuillier and Waterhouse, Surveyor-General and Assistant-Surveyor-General of India. The scope of the tables, however, has been extended so as to meet, as far as possible, the ordinary requirements of general and scientific reference. The multiples and fractions of the British and metric units have each their equivalent expressed in the other, so that the number requiring to be converted may be multiplied directly by the decimal fraction representing the equivalent value of one unit of the required denomination. The relative equivalents are given for the conversion of measures of length, weight, and capacity, cubic and square measures, and also of British-Indian and metric weights. There are also a few miscellaneous tables that may be found generally useful.

It is well known that whales can remain a long time under water, but exact data as to the time have been rather lacking. In his northern travels, Dr. Kückenthal, of Jena, recently observed that a harpooned white whale continued under water 45 minutes.

THE elephant skeleton set up in the front hall of the Madras Museum is 10 feet 6 inches high, and it has been stated that this is the skeleton of the largest elephant ever killed in India. Mr. Edgar Thurston, Superintendent of the Museum, in his latest Report, says that this is a mistake. Mr. Sanderson gave 10 feet 7½ inches as the largest elephant he had met, and there is a still larger one in the Indian Museum, Calcutta.

SOME fragments of a gigantic elephant's tusk (we learn from the *Rivista Sci. Ind.*) were lately obtained by Signor Terrenzi, the tusk having been found in the yellow Pliocene (marine) sands of Camartina, Narni. It must have been about 10 feet long. One piece (which seems to have been near the base) measured about 2 feet round at the thickest. The tusk had been broken up by the peasants, and distributed as an infallible remedy for tooth-ache and for belly pains in cattle! It probably belonged either to *E. meridionalis*, Nesti, or to *E. antiquus*, Falco. The finding of elephant remains in the Pliocene marine sands of Italy is not new, but it is rare.

A REMARKABLE paper on "The Ethnologic Affinity of the Ancient Etruscans," by Dr. Daniel G. Brinton, was read before the American Philosophical Society on October 18, and has now been issued separately. Dr. Brinton's attention was specially called to the subject during a sojourn of some months in Italy, early in the present year, when he had an opportunity of studying many museums of Etruscan antiquities. The object of the

paper is to prove that the Etruscans probably came from Northern Africa, and belonged to the same stock as the Kabyles, on the borders of whose country Dr. Brinton had spent some time before his visit to Italy. He thus sums up his conclusions:—

(1) The uniform testimony of the ancient writers and of their own traditions asserts that the Etruscans came across the sea from the south, and established their first settlement on Italian soil near Tarquinii; this historic testimony is corroborated by the preponderance of archæologic evidence as yet brought forward. (2) Physically, the Etruscans were a people of lofty stature, of the blonde type, with dolichocephalic heads. In these traits they corresponded precisely with the blonde type of the ancient Libyans, represented by the modern Berbers and the Guanches, the only blonde people to the south. (3) In the position assigned to woman, and in the system of federal government, the Etruscans were totally different from the Greeks, Orientals, and Turanians; but were in entire accord with the Libyans. (4) The phonetics, grammatical plan, vocabulary, numerals, and proper names of the Etruscan tongue present many and close analogies with the Libyan dialects, ancient and modern. (5) Linguistic science, therefore, concurs with tradition, archæology, sociologic traits, and anthropologic evidence, in assigning a genetic relationship of the Etruscans to the Libyan family.

A LAKE-DWELLING has been discovered in the neighbourhood of Somma Lombardo, north-west of Milan, through the draining of the large turf moor of La Lagozza. The Berlin Correspondent of the *Standard*, who gives an account of the discovery, says that this "relic of civilization" was found under the peat-bog and the underlying layer of mud, the former being 1 metre in thickness, and the latter 35 centimetres. The building was rectangular, 80 metres long and 30 metres broad; and between the posts, which are still standing upright, lay beams and half-burnt planks, the latter having been made by splitting the trees, and without using a saw. Some trunks still retain the stumps of their lateral projecting branches, and they have probably served the purpose of ladders. The lower end of these posts, which have been driven into the clay soil, is more or less pointed, and it can be seen from the partly still well-preserved bark that the beams and planks are of white birch, pine, fir, and larch. Among other things were found polished stone hatchets, a few arrow-heads, flint knives, and unworked stones with traces of the action of fire.

MR. R. ETHERIDGE, JUN., contributes to the Report of the Australian Museum, just received, an interesting appendix on the limestone caves at Cave Flat, junction of the Murrumbidgee and Goodradigbee rivers, county of Harden. Having recorded the observations made by him in these remarkable caves, Mr. Etheridge offers some remarks on the Murrumbidgee limestone. This, he says, is of a dense blue-black colour. It is much jointed and fissured, highly brittle in places, with a hackly conchoidal fracture, and crammed with fossils, especially corals. As a display of these beautiful organisms in natural section, he has never seen its equal. Large faces of limestone may be seen, with the weathered corals, and particularly *Stromatopora*, standing out in relief and in section also. Many of these masses of coral, particularly those of *Stromatopora* and *Favosites*, are as much as 4 feet in diameter. The Murrumbidgee limestone has been classed as Devonian by the late Prof. de Koninck, but Mr. Etheridge has not yet sufficiently examined the fossils of this deposit either to gainsay or confirm this view. He thinks it not improbable, however, that Prof. de Koninck's view may be correct.

THE *Comptes rendus* of the Paris Academy of Sciences, of November 4, contains a note by M. A. Angot, on the mean hourly velocity of the wind at the summit of the Eiffel Tower,

measured during 101 days, ending with October 1, by means of an anemometer placed at 994 feet above the ground, and compared with the results of a similar instrument at the Paris Meteorological Office, placed at 66 feet above the ground. The average velocity on the tower was 16 miles an hour, being over three times the amount registered at the Meteorological Office, where it was only 5 miles an hour. At the lower station the diurnal variation showed a single minimum about sunrise, and a single maximum about 1 h. p.m. On the tower the minimum occurred about 10 h. a.m., and the maximum about 1 h. p.m., while the characteristic maximum of lower regions about the middle of the day was hardly perceptible on the tower. It is remarkable that this inversion, which is usual upon high mountains, should occur at so small a height as that of the Eiffel Tower. The ratio of increased velocity was constant at about 5 : 1 between midnight and 5 h. a.m.; it then decreased rapidly and became 2 : 1 at about 10 h. a.m., and maintained this value until 2 h. or 3 h. p.m., when it again rose regularly until midnight. These results are of considerable importance to the study of aerial navigation.

THE new number of the *Mineralogical Magazine* opens with an important paper, by Mr. L. Fletcher, F.R.S., on the meteorites which have been found in the desert of Atacama and its neighbourhood. This paper is accompanied by a map of the district. Prof. McKenny Hughes, F.R.S., has a paper on the manner of occurrence of Beekite and its bearing upon the origin of siliceous beds of Palæolithic age. There are also three short papers by Dr. M. F. Heddle, and one by Mr. R. H. Solly.

SOME experiments on the photography of the red end of the spectrum, by Colonel J. Waterhouse, appear in the Proceedings of the Asiatic Society of Bengal for April 1889. In order to render the ordinary commercial gelatine dry plates sensitive to the red rays they are bathed for one or two minutes in a solution of 1 part of alizarin blue ($C_{17}H_9NO_4$) to 10,000 parts of distilled water with 1 per cent. of strong ammonia added. Plates treated with this dye show very intense action through the violet and blue regions as far as *b*; from E to C there appears to be a minimum of action; the sensitiveness, however, increases between C and A, and is strongest between C and B and a to A. Below A the sensitiveness quickly diminishes. Colonel Waterhouse finds that plates saturated with a special preparation of cyanin and sulphate of quinine have their maximum sensitiveness between D and B, but between B and A the action is much weaker than that obtained by using alizarin blue, hence the latter dye is valuable as a ready and simple means of photographing the spectrum between C and A with ordinary dry plates. For orthochromatic photography, rhodamine was found to be almost as efficient as erythrosin, and to be especially useful for photographing the region immediately about D. The photographs were taken by means of Rowland's plane and concave diffraction gratings.

A NEW mode of preparing manganese, by which the metal can be obtained in a few minutes in tolerably large quantities and almost perfectly pure, is described by Dr. Glatzel, of Breslau, in the current number of the *Berichte*. A quantity of manganoous chloride is first dehydrated by ignition in a porcelain dish, and the pulverized anhydrous salt afterwards intimately mixed with twice its weight of well-dried potassium chloride. The mixture is then closely packed into a Hessian crucible and fused in a furnace at the lowest possible temperature, not sufficient to volatilize either of the chlorides. A quantity of metallic magnesium is then introduced in small portions at a time, the total quantity necessary being about a sixth of the weight of the manganoous chloride employed. Provided the crucible has not been heated too much above the melting-point of the mixture of chlorides, the action is regular, the magnesium dissolving with

merely a slight hissing. If, however, the mixture has been heated till vapours have begun to make their appearance, the reaction is extremely violent. It is therefore best to allow the contents of the crucible, after fusion, to cool down to a low red heat, when the introduction of the magnesium is perfectly safe. When all action has ceased, the contents of the crucible are again heated strongly, and afterwards allowed to cool until the furnace has become quite cold. On breaking the crucible, all the potassium chloride and the excess of manganous chloride is found to have been volatilized, leaving a regulus of metallic manganese, fused together into a solid block, about three parts by weight being obtained for every two parts of magnesium added. The metal, as thus obtained, is readily broken up by hammering into fragments of a whitish-gray colour possessing a bright metallic lustre. The lustre may be preserved for months in stoppered glass vessels, but, when exposed to air, the fresh surface becomes rapidly brown. The metal is so hard that the best files are incapable of making any impression upon it. It is so feebly magnetic that a powerful horse-shoe magnet capable of readily lifting a kilogram of iron has no appreciable effect upon the smallest fragment. It was noticed that the introduction of a small quantity of silica rendered the manganese still more brittle, and caused it to present a conchoidal fracture, that of pure manganese being uneven. The specific gravity of the metal, former determinations of which have been very varied, was found to be 7.3921 at 22° C. This number, which was obtained with a very pure preparation, is about the mean of the previous determinations. Dilute mineral acids readily dissolve the pulverized metal, leaving a mere trace of insoluble impurity. It is also satisfactory that practically no magnesium is retained alloyed with the manganese, and the introduction of carbon is altogether avoided by the use of this convenient method.

THE additions to the Zoological Society's Gardens during the past week include a Common Marmoset (*Hapale jacchus*) from South-East Brazil, presented by Mr. O. Burrell; a Common Squirrel (*Sciurus vulgaris*), British, presented by Miss B. Tatham; a Common Stoat (*Mustela erminea*) from Northamptonshire, presented by Mr. Cuthbert Johnson; a Wattled Crane (*Grus carunculata*) from West Africa, presented by Mr. Robert Sinclair, Jun.; a Redshank (*Totanus calidris*) from Devonshire, presented by Mr. R. M. J. Teil; a White-backed Piping Crow (*Gymnorhina leuconota*) from Australia, presented by Mr. W. H. Felstead; a Grey-headed Porphyrio (*Porphyrio poliocephalus*) from India, presented by Dr. Gerard Smith; a Common Chameleon (*Chameleon vulgaris*) from North Africa, presented by Mr. G. W. Alder; a Dwarf Chameleon (*Chameleon pumilus*) from South Africa, presented by Mrs. Leith; a Green Lizard (*Lacerta viridis*), European, presented by Mr. C. H. Whitlow; a Common Jay (*Garrulus glandarius*), European, purchased; five Carpet Snakes (*Morelia variegata*) from Australia, received in exchange.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m., November 21 = 2h. 3m. 21s.

Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
(1) G. C. 527	—	—	h. m. s.	
(2) 15 Arietis	6	Yellowish-red.	2 15 28	+41 35
(3) α Arietis... ..	2	Yellow.	2 4 31	+18 59
(4) β Trianguli	3	Bluish-white.	2 1 0	+22 57
(5) DM + 56° 724	9	Reddish-yellow.	2 3 0	+34 28
(6) R Tauri	Var.	Very red.	2 42 32	+50 31
			4 22 16	+9 55

Remarks.

(1) Sir John Herschel's description of this nebula is as follows:—! Bright, very large, very much extended. The spectrum has not yet been recorded.

(2) This is a star of Group II., in which Dunér records bands 2-8, but states that they are neither wide nor dark. The star falls in species 13 of the subdivision of this group, and is well advanced towards Group III. Metallic lines, and possibly hydrogen lines (dark) may therefore be expected. In the earlier stages of the group, no hydrogen lines appear, the radiation from the interspaces between the meteorites being balanced by the absorption of the gas surrounding the incandescent stones; but in the more advanced members, as in α Orionis, the absorption will probably be found to slightly predominate. The presence or absence of the F line, and of metallic lines, and their relative intensities, should therefore be noted.

(3) This is a star of either Group III. or Group V., and the usual criteria (see p. 20) should be observed in order to determine which. At the same time, the relative intensities of the hydrogen lines and the metallic lines (say b and D) should be recorded, so that the star may be placed in a line of temperature with others.

(4) According to Gothard this is a star of Group IV. The usual observations are required.

(5) Dunér classes this with Group VI. stars, but states that the type of spectrum is a little doubtful. Further observations are therefore required. As the most advanced stars of the group are very red, the colour of this star indicates that it probably belongs to an early stage of the group, in which the carbon bands would be narrow, and therefore somewhat difficult to observe with certainty; in that case traces of b and D might be expected. The colour should also be checked.

(6) Gore gives the period of this variable as 325.6 days, and the range as 7.4-9.0 at maximum to < 13 at minimum. The maximum will occur on November 30. The spectrum is of the Group II. type, and belongs to species 9. Dunér states that the dark bands, especially 7 and 8, are very wide. In several variables of this class (R Leonis, R Andromedæ, &c.), Espin has observed bright hydrogen lines near maximum, and the question is, Is this common to all the variable stars of this type? As stated with reference to 15 Arietis, under normal conditions the hydrogen lines in the earlier species of the group are absent, because the interspatial radiation balances the absorption; but if through some cause the temperature increases at maximum, more hydrogen would be driven into the interspaces and radiation would predominate. It may be mentioned that, according to the meteoritic theory, the increase of temperature and luminosity is brought about by the periastrion passage of a secondary swarm through the outliers of the central one. It is not unlikely that slight variations of colour will take place from maximum to minimum, and it is important therefore that the colour should be noted when the spectroscopic observations are made.

A. FOWLER.

THE MINIMUM SUN-SPOT PERIOD.—M. Bruguère, in *L'Astronomie*, November 1889, gives a series of observations made with a view to determine the exact date of the minimum sun-spot period. The following tables show the condition of the sun's surface with respect to spots from the beginning of January to the end of July of this year:—

Date, 1889.	No. of days without spots.	Date, 1889.	No. of days with spots.
Jan. 3-15	13	Jan. 16-17	2
„ 18-31	14	Feb. 1-7	7
Feb. 8-21	14	„ 22-29	8
Mar. 2-6	5	Mar. 1 and 8-16	10
„ 17-31	15	April 1-10	10
April 11-30	20	May 6-9	4
May 1-5	5	„ 27	1
„ 10-26	17	June 16-28	13*
„ 28-31	3	July 12-24	13*
June 1-15	15	„ 28-31	4
„ 29-30	2		
July 1-11	11		
„ 25-27	3		

* The same spot.

If the small spots that were seen from May 6-9, and also on May 27, be neglected, it will be seen that there would be a period without spots extending from April 11 to June 15—that